



## **LOWELL CONTRIBUTORY RETIREMENT SYSTEM**

### **ACTUARIAL VALUATION as of**

**January 1, 2017**

Prepared by:

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September 25, 2017

Lowell Contributory Retirement Board  
City Hall, Room 3  
375 Merrimack Street  
Lowell, MA 01852

Dear Board Members:

We are pleased to present the enclosed report summarizing the results of our actuarial valuation of the Lowell Contributory Retirement System as of January 1, 2017.

Our valuation was performed in accordance with the provisions contained in Chapter 32 of the Massachusetts General Laws, "M.G.L.", as of January 1, 2017. Disclosures under GASB Statement No. 67, Financial Reporting for Pension Plans (GASB 67) and GASB Statement No. 68, Accounting and Financial Reporting for Pensions (GASB 68) are provided in a separate report.

The principal results of our valuation are summarized in Section 2. The summary of Plan provisions and actuarial methods and assumptions are shown in Sections 5 and 6, respectively. Section 7 summarizes the demographic profile of active members, retired plan members and beneficiaries and disabled plan members. Asset information and actuarial liabilities are presented in Section 2. The development of the required appropriations pursuant to Chapter 32 of the M.G.L. is shown in Section 3. The summary of information for PERAC is presented in Section 4.

We also provide a 30-year forecast of the required appropriations and cash flows in Section 3.

Our actuarial valuation is based on an investment return rate of 7.75%, compounded annually. Our calculations were based on participant census and asset data and other information provided by the Lowell Contributory Retirement System and the benefit provisions of Chapter 32 of the M.G.L. as of January 1, 2017.

Our valuation follows generally accepted actuarial methods and we perform such tests as we consider necessary to assure the accuracy of the results. The amounts presented in this report have been appropriately determined according to the actuarial assumptions and methods stated herein.

We appreciate this opportunity to be of service to the Lowell Contributory Retirement Board. We are available to answer any questions with respect to our valuation.

Respectfully submitted,

A handwritten signature in black ink, reading "Linda Bournival". The signature is fluid and cursive, with the first name "Linda" and last name "Bournival" clearly distinguishable.

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Linda L. Bournival, FSA  
Member, American Academy of Actuaries

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## ACTUARIAL CERTIFICATION

This report presents the results of the Actuarial Valuation for the Lowell Contributory Retirement System as of January 1, 2017. The report presents the funding schedule contribution amounts for the fiscal years beginning 2019.

This valuation is based upon member data provided by the Retirement Board and asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Lowell Contributory Retirement System. Although we did not audit the data used in the valuation, we believe that the information is complete and reliable.

This report was completed in accordance with generally accepted actuarial standards and procedures, and conforms to the Code of Professional Conduct of the American Academy of Actuaries. The actuarial assumptions used in the determination of costs are reasonably related to the experience of the System and to reasonable expectations, and represent our best estimate of anticipated long-term experience under the System.

Future actuarial valuation results may differ significantly from the current results presented in this report. Examples of potential sources of volatility include plan experience differing from that anticipated by the economic or demographic assumptions, the effect of new entrants, changes in economic or demographic assumptions, the effect of law changes and the delayed effect of smoothing techniques.

This report is intended for the sole use of the Lowell Contributory Retirement System and is intended to provide information to comply with the stated purpose of the report. It may not be appropriate for other purposes.

The undersigned credentialed actuaries are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinion contained herein. They are available to answer any questions with regard to this report.

Respectfully submitted,



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Linda L. Bournival, FSA  
Member, American Academy of Actuaries  
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David M. Mirabito, FSA  
Member, American Academy of Actuaries  
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## SECTION 1 - SUMMARY

### Background

We have completed the Actuarial Valuation of the Lowell Contributory Retirement System as of January 1, 2017. This valuation is based upon census data provided by the Retirement Board and asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Lowell Contributory Retirement Board. Information for the prior valuation completed as of January 1, 2015 was obtained from the valuation report prepared by KMS Actuaries.

### Massachusetts General Laws

The valuation was prepared in accordance with Chapter 32 of the Massachusetts General Laws ("M.G.L.").

The valuation does not take into consideration:

- Changes in the law after the valuation date,
- Transfers between retirement systems pursuant to Section 3(8)(c) of Chapter 32,
- State-mandated benefits and
- Cost-of-living increases granted to members in pay status between 1982 and 1997.

### GASB Statement Numbers 67 and 68

In June 2012, the GASB approved two related Statements that significantly changed the way pension plans and governments account and report pension liabilities. Effective for plans with fiscal years beginning after June 15, 2013, GASB Statement No. 67, Financial Reporting for Pension Plans, replaced the requirements of Statement No. 25 and effective for employers with fiscal years beginning after June 15, 2014, GASB Statement No. 68, Accounting and Financial Reporting for Pensions, replaced the requirements of Statement No. 27.

The new pension standards reflect changes from those currently in place regarding how governments calculate total pension liability and pension expense. Further, the new standards contain requirements for disclosing information in the notes to financial statements and presenting required supplementary information following the notes.

The required disclosures and notes under the new GASB Statements for the fiscal year ending December 31, 2016 are provided in a separate report.

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## SECTION 1 - SUMMARY

### Actuarial Valuation

During the two years since the last valuation, the total unfunded actuarial accrued liability of the System was expected to increase from \$251,251,589 as of January 1, 2015 to \$252,728,064 as of January 1, 2017, for a total increase of \$1,476,475. The actual unfunded actuarial accrued liability, before any assumption or plan changes, was \$254,181,869, resulting in an actuarial loss of \$1,453,805. The actuarial loss was primarily due to an asset loss of \$5,289,123 and a demographic experience gain of \$3,835,318. The details of the gain and loss analysis are provided in Exhibit 2.6.

### Appropriations

The funding appropriation for each year is computed as the sum of the normal cost and an amortization payment to pay off the Unfunded Actuarial Liability, adjusted for annual payments of the appropriation made at the beginning of each fiscal year. The appropriation calculated as of the January 1, 2017 valuation is \$26,377,849, and is made up of a normal cost payment of \$6,808,465 and an amortization payment of \$19,569,384. The amortization method is an increasing amortization of the unfunded actuarial accrued liability at 4% over 19 years and is expected to fully pay the unfunded actuarial accrued liability by the year 2036. The development of the appropriation as of January 1, 2017 is presented in Exhibit 3.1.

For fiscal year 2018, we show the actual appropriation developed under the previous funding schedule and reported on the PERAC "Required Fiscal Year 2018 Appropriation" letter dated November 3, 2016 of \$26,141,731. For fiscal year 2019, we developed an annual appropriation of \$27,448,818, which is made up of a normal cost of \$7,253,615 and payment toward the unfunded actuarial accrued liability of \$20,195,203. The unfunded actuarial accrued liability is expected to be fully paid by 2036. The current funding schedule is shown in Exhibit 3.2.

At the September 18, 2015 meeting of the Lowell Retirement Board, the Board voted to increase the Cost of Living Adjustment (COLA) base from \$15,000 to \$16,000 effective July 1, 2016 and to increase the COLA base to \$17,000 effective July 1, 2017. At its October 6, 2015 meeting, the City Council approved the COLA base increases. Further details on the funding schedule are presented in Section 3.

## SECTION 1 - SUMMARY

A summary of principal valuation results from the current valuation and the prior valuation follows. Changes in actuarial assumptions and methods and Plan provisions are discussed below, as well as changes in census data and asset information.

Valuation Date	<u>1/1/2017</u>	<u>1/1/2015</u>	<u>Increase/ (Decrease)</u>
<b>Summary of Member Data</b>			
Active Members	1,693	1,702	(0.5%)
Average Age	46.8	47.0	(0.5%)
Average Service	13.1	13.0	0.8%
Salary	\$92,810,806	\$89,520,851	3.7%
Average Salary	\$54,820	\$52,597	4.2%
Valuation Salary	\$92,810,806	\$89,520,851	3.7%
Retired Members and Beneficiaries	1,028	996	3.2%
Average Age	72.7	73.1	(0.5%)
Total Annual Pension	\$28,023,215	\$25,388,138	10.4%
Average Annual Pension	\$27,260	\$25,490	6.9%
Disabled Members	198	197	0.5%
Average Age	66.0	66.6	(0.9%)
Total Annual Pension	\$7,916,762	\$7,468,677	6.0%
Average Annual Pension	\$39,984	\$37,912	5.5%
Inactive Members	294	268	9.7%
Annuity Savings Fund	\$6,304,050	\$6,027,683	4.6%
<b>Actuarial Accrued Liability (AAL)</b>	<b>\$613,481,727</b>	<b>\$558,002,459</b>	<b>9.9%</b>
<b>Assets</b>			
Market Value of Assets (MVA)	\$329,424,819	\$314,467,705	4.8%
Actuarial Value of Assets (AVA)	343,717,080	306,750,870	12.1%
<b>Unfunded Accrued Liability</b>	<b>\$269,764,647</b>	<b>\$251,251,589</b>	<b>7.4%</b>
<b>Funded Status on AVA</b>	<b>56.0%</b>	<b>55.0%</b>	<b>1.8%</b>
<b>Funded Status on MVA</b>	<b>53.7%</b>	<b>56.4%</b>	<b>(4.8%)</b>
<b>Normal Cost</b>			
Employer	\$6,408,465	\$5,620,591	14.0%
Employee	8,493,702	8,081,160	5.1%
Administrative Expenses	400,000	350,000	14.3%
Total Normal Cost	\$15,302,167	\$14,051,751	8.9%

Lowell Contributory Retirement System  
Actuarial Valuation as of January 1, 2017



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## SECTION 1 - SUMMARY

Valuation Date	<u>1/1/2017</u>	<u>1/1/2015</u>	<u>Increase/ (Decrease)</u>
<b>Appropriations</b>			
Fiscal Year 2018	\$26,141,731	\$26,141,731	0.0%
Fiscal Year 2019	\$27,448,818	\$27,068,555	1.4%
Fiscal Year 2020	\$28,821,259	\$28,029,334	2.8%

### Actuarial Assumptions and Methods

Some Actuarial Assumptions and Methods used in this valuation have changed since the last valuation, including decreasing the investment return rate from 8% to 7.75% and increasing the administrative expense assumptions from \$350,000 to \$400,000. Changing these assumptions resulted in a net increase in the unfunded actuarial accrued liability of \$15,582,778 and an increase in the employer normal cost of \$761,469. The Actuarial Assumptions and Methods used in this valuation are detailed in Section 6, Actuarial Assumptions and Methods.

### Plan Provisions

The plan provision are the same as those used in the previous valuation and are detailed in Section 5, Summary of Plan Provisions.

### Census Data

As of January 1, 2017, there are 1,693 active members who may be eligible for benefits in the future, 1,028 retirees and beneficiaries, 294 inactives and 198 disabled retirees. Summaries of the active, retired and disabled employees are included in Section 7, Demographic Information.

### Assets

This valuation is based upon asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Lowell Contributory Retirement Board. The market value of assets increased from \$314,467,705 as of January 1, 2015 to \$329,424,819 as of January 1, 2017. During the plan years ended 2015 and 2016, the rates of return on the market value of assets were 0.40% and 7.03%, respectively.

The actuarial value of assets increased from \$306,750,870 as of January 1, 2015 to \$343,717,080 as of January 1, 2017. During the plan years ended 2015 and 2016, the computed rates of return on the actuarial value of assets were 6.86% and 7.52%, respectively.

## SECTION 2 - PRINCIPAL VALUATION RESULTS

### Exhibit 2.1 - Plan Assets

Asset information is reported annually to the Public Employee Retirement Administration Commission by the Lowell Contributory Retirement System. The Market Value of Assets for the two most recent calendar years are as follows:

Calendar Year	2016	2015
<b>Trust Fund Composition at Year-End</b>		
Cash	\$9,048,764	\$7,648,514
Short-Term Investments	0	0
Fixed Income Securities	0	0
Equities	0	921,761
Pooled Short Term Funds	0	0
Pooled Domestic Equity Funds	0	0
Pooled International Equity Funds	0	0
Pooled Global Equity Funds	0	0
Pooled Domestic Fixed Income Funds	0	0
Pooled International Fixed Income Funds	0	0
Pooled Global Fixed Income Funds	0	0
Pooled Alternative Investments	653,098	848,621
Pooled Real Estate Funds	140,499	625,086
Pooled Domestic Balanced Funds	0	0
Pooled International Balanced Funds	0	0
PRIT Absolute	0	0
PRIT Cash	400,936	800,402
PRIT Fund	319,181,523	300,084,658
Interest Due & Accrued	0	0
Prepaid Expenses	0	0
Accounts Receivable	0	0
Land	0	0
Buildings	0	0
Accumulated Depreciation - Buildings	0	0
Accounts Payable	0	0
Total Market Value of Assets	<u>\$329,424,819</u>	<u>\$310,929,041</u>

## SECTION 2 - PRINCIPAL VALUATION RESULTS

### Exhibit 2.1 - Plan Assets

Calendar Year	2016	2015
<b>Funds</b>		
Annuity Savings Fund	\$96,340,991	\$94,324,084
Annuity Reserve Fund	31,692,361	30,516,092
Special Military Service Cr Fund	16,831	16,814
Pension Fund	0	0
Expense Fund	0	0
Pension Reserve Fund	201,374,636	186,072,051
Total Market Value of Assets	<u>\$329,424,819</u>	<u>\$310,929,041</u>
<b>Asset Activity</b>		
Market value as of Beginning of Year	\$310,929,041	\$314,467,705
Contributions and Receipts	35,095,387	31,782,580
Benefit Payments and Expenses	(38,349,054)	(36,569,013)
Investment Return	21,749,445	1,247,769
Market Value as of End of Year	\$329,424,819	\$310,929,041
<b>Computed Rate of Return</b>	7.03%	0.40%

Returns and annualized past returns developed by PERAC are shown below. Information is obtained from the Annual Investment Reports published by PERAC for the years shown.

Year	1-Year Return	5-Year Return	Return (Since 1985)
2016	7.58%	8.94%	8.99%
2015	1.03%	7.42%	9.04%
2014	8.17%	9.90%	9.32%
2013	14.97%	11.57%	9.36%
2012	13.52%	1.24%	9.16%
2011	0.28%	0.93%	9.00%
2010	13.25%	4.07%	9.35%
2009	16.62%	3.84%	9.20%
2008	-29.27%	3.14%	8.90%
2007	11.79%	14.56%	10.97%
2006	16.91%	9.26%	10.93%
2005	12.02%	3.75%	10.65%

## SECTION 2 - PRINCIPAL VALUATION RESULTS

### Exhibit 2.1 - Plan Assets

Valuation Date	1/1/2017	1/1/2016
<b>1. Market Value of Assets as of prior January 1</b>	\$310,929,041	\$314,467,705
a. Prior Year Contributions and Receipts	35,095,387	31,782,580
b. Prior Year Benefit Payments and Expenses	(38,349,054)	(36,569,013)
c. Expected Investment Return Rate	8.00%	8.00%
d. Expected Investment Return	24,733,331	24,950,004
e. Expected Market Value of Assets as of Valuation Date	\$332,408,705	\$334,631,276
<b>2. Prior Year Gain / (Loss)</b>		
a. Market Value of Assets as of January 1	\$329,424,819	\$310,929,041
b. Expected Market Value of Assets	332,408,705	334,631,276
c. Prior Year Gain / (Loss)	(2,983,886)	(23,702,235)
<b>3. Phase-In of Asset Gains and Losses</b>		
	Unrecognized	Unrecognized
Plan Year	Gain / (Loss)	Gain / (Loss)
a. 2016	(\$2,983,886)	-
b. 2015	(23,702,235)	(18,961,788)
c. 2014	(1,887,986)	(1,132,791)
d. 2013	15,356,915	6,142,766
e. 2012	10,292,458	2,058,492
f. Total deferred gains/(losses)	(14,292,261)	(11,893,321)
<b>4. Actuarial Value of Assets</b>		
a. Market Value of Assets Less Unrecognized Gain / (Loss)	\$343,717,080	\$322,822,362
b. 90% of Market Value of Assets	296,482,337	279,836,137
c. 110% of Market Value of Assets	362,367,301	342,021,945
d. Actuarial Value of Assets, a., but not less than b. and not greater than c.	\$343,717,080	\$322,822,362
e. Ratio of Actuarial Value of Assets to Market Value of Assets	104.34%	103.83%
<b>5. Rate of Return on Actuarial Value of Assets for     Prior Calendar Year</b>	7.52%	6.86%

## SECTION 2 - PRINCIPAL VALUATION RESULTS

The **Actuarial Present Value of Future Benefits** is the present value of the cost to finance all benefits payable in the future, discounted to reflect the probability of payment and the time value of money. Below is the Actuarial Present Value of Future Benefits from the current valuation and the prior valuation:

**Exhibit 2.2 - Actuarial Present Value of Future Benefits**

Valuation Date	<u>1/1/2017</u>	<u>1/1/2015</u>
<b>Actives</b>		
Superannuation	\$326,685,746	\$301,499,033
Termination	7,824,590	7,848,938
Death	14,551,213	13,422,843
Disability	40,633,691	36,195,729
Total Actives	<u>\$389,695,240</u>	<u>\$358,966,543</u>
<b>Retired Members and Inactives</b>		
Retired Members and Beneficiaries	\$268,709,069	\$234,795,699
Disabled Members	86,042,257	79,222,112
Inactive Members	6,304,050	6,027,683
Total Retired Members and Inactives	<u>\$361,055,376</u>	<u>\$320,045,494</u>
<b>Total Present Value of Future Benefits</b>	<b>\$750,750,616</b>	<b>\$679,012,037</b>

The **Actuarial Accrued Liability** is the portion of the Actuarial Present Value of Future Benefits which is allocated to all periods prior to a valuation year and therefore is not provided for by future Normal Costs. Below is the Actuarial Accrued Liability from the current valuation and the prior valuation:

**Exhibit 2.3 - Actuarial Accrued Liability**

Valuation Date	<u>1/1/2017</u>	<u>1/1/2015</u>
<b>Actives</b>		
Superannuation	\$231,283,749	\$217,355,657
Termination	2,248,529	2,445,269
Death	6,015,412	5,796,654
Disability	12,878,661	12,359,385
Total Actives	<u>\$252,426,351</u>	<u>\$237,956,965</u>
<b>Retired Members and Inactives</b>		
Retired Members and Beneficiaries	\$268,709,069	\$234,795,699
Disabled Members	86,042,257	79,222,112
Inactive Members	6,304,050	6,027,683
Total Retired Members and Inactives	<u>\$361,055,376</u>	<u>\$320,045,494</u>
<b>Total Actuarial Accrued Liability</b>	<b>\$613,481,727</b>	<b>\$558,002,459</b>

## SECTION 2 - PRINCIPAL VALUATION RESULTS

The **Normal Cost** is the portion of the Actuarial Present Value of Future Benefits which is allocated to a valuation year. Only active employees who have not reached Normal Retirement Age incur a Normal Cost. Below is the Normal Cost from the current valuation and the prior valuation:

**Exhibit 2.4 - Normal Cost**

Valuation Date	<u>1/1/2017</u>	<u>1/1/2015</u>
<b>Actives</b>		
Superannuation	\$10,027,747	\$9,161,546
Termination	1,299,940	1,275,816
Death	942,283	874,444
Disability	2,632,197	2,389,945
Total Actives	\$14,902,167	\$13,701,751
 <b>Administrative Expenses</b>	 \$400,000	 \$350,000
 <b>Total Normal Cost</b>		
Normal Cost	\$15,302,167	\$14,051,751
As a Percentage of Salary	16.5%	15.7%
 <b>Employee Normal Cost</b>		
Employee Contributions	\$8,493,702	\$8,081,160
As a Percentage of Salary	9.2%	9.0%
 <b>Employer Normal Cost</b>		
Employer Normal Cost	\$6,808,465	\$5,970,591
As a Percentage of Salary	7.3%	6.7%

**Exhibit 2.5 - Unfunded Actuarial Accrued Liability**

Valuation Date	<u>1/1/2017</u>	<u>1/1/2015</u>
<b>Unfunded Actuarial Accrued Liability</b>		
a. Actuarial Accrued Liability	\$613,481,727	\$558,002,459
b. Actuarial Value of Assets	343,717,080	306,750,870
c. Unfunded Actuarial Accrued Liability (a. - b.)	\$269,764,647	\$251,251,589
d. Funded Ratio (b. divided by a.)	56.0%	55.0%

## SECTION 2 - PRINCIPAL VALUATION RESULTS

### Exhibit 2.6 - Actuarial Experience

In performing the actuarial valuation, various assumptions are made regarding mortality, retirement, disability and withdrawal rates as well as salary increases and investment returns. A comparison of the results of the current valuation and the prior valuation is made to determine how closely actual experience relates to expected. During the two years since the last valuation, the total unfunded actuarial accrued liability of the System was expected to increase by \$1,476,475. Below is the development of the Actuarial Gain or Loss for the current 2-year period:

Calendar Year Ending	<u>12/31/2016</u>	<u>12/31/2015</u>
<b>Expected Unfunded Actuarial Accrued Liability</b>		
a. Unfunded Actuarial Accrued Liability, beginning of year	\$253,367,782	\$251,251,589
b. Normal cost, beginning of year	14,543,562	14,051,751
c. Total contributions	35,095,387	31,782,580
d. Interest (full year on a. and b., monthly on c.)	19,912,107	19,847,022
e. Expected Unfunded Actuarial Accrued Liability	\$252,728,064	\$253,367,782
f. Unfunded Actuarial Accrued Liability (before changes)	\$254,181,869	
g. (Gain)/Loss	\$1,453,805	
<b>Asset (gain)/loss</b>		
a. Actuarial value of assets, beginning of year	\$322,822,362	\$306,750,870
b. Contributions and Receipts	35,095,387	31,782,580
c. Benefit Payments and Expenses	(38,349,054)	(36,569,013)
d. Assumed rate of return	8.00%	8.00%
e. Expected return	25,684,797	24,332,658
f. Actuarial value of assets, end of year	343,717,080	322,822,362
g. Actual return	24,148,385	20,857,925
h. Actual rate of return	7.52%	6.86%
i. Asset (gain)/loss	\$1,536,412	\$3,474,733
j. Total asset (gain)/loss, 2-year period	\$5,289,123	
<b>Actual Unfunded Actuarial Accrued Liability</b>		
a. Changes due to:		
i) Asset (gain)/loss	\$5,289,123	
ii) (Gain)/loss from demographic experience	(3,835,318)	
iii) Total (Gain)/loss prior to changes	1,453,805	
iv) Unfunded Actuarial Accrued Liability (before changes)	254,181,869	
v) Assumption changes	15,582,778	
vi) Plan changes	-	
b. Unfunded Actuarial Accrued Liability, end of year	269,764,647	

## SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

### Exhibit 3.1 - Annual Appropriations

The **Annual Appropriation** is determined in accordance with the requirements set forth in Sections 22D and 22F of Chapter 32 of the Massachusetts General Laws ("M.G.L."). The appropriation is comprised of the annual employer normal cost and amortization payments to pay the unfunded actuarial accrued liability. Below are the details of the annual appropriation for the current valuation.

Amortization Payment	Outstanding Balance at 1/1/2017	Period (in years)	Payment Increase Rate	Total Appropriation at 1/1/2017
a. Early Retirement Incentive (2002)	\$0	0	0.00%	\$0
b. Early Retirement Incentive (2003)	\$1,401,476	3	0.00%	\$502,429
c. Assumption Change	\$15,582,778	19	4.00%	\$1,107,142
d. Plan Change	\$0	19	4.00%	\$0
e. Unfunded Actuarial Accrued Liability	\$252,780,393	19	4.00%	\$17,959,813
f. Total	\$269,764,647			\$19,569,384
<b>Normal Cost</b>				\$6,808,465
<b>Total Appropriation at Valuation Date</b>				\$26,377,849



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## SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

Exhibits 3.2 and 3.3, are based on the assumptions below:

- Payroll and Total Normal Cost are both expected to increase 3.50% per year.
- The Employee Contribution rate will increase linearly from the 2017 percentage to 10.50% by 2039 as members contributing at the lower rates are replaced by new members contributing over 9%.
- Employer Normal Cost is the difference between Total Normal Cost and Employee Contributions.
- The Unfunded Actuarial Accrued Liability ("UAL") is computed as of January 1 of each year assuming no future gains or losses.
- The Amortization Payment of UAL is to be paid over 19 years through 2036, based on annual payments increasing at 4% per year.
- The Amortization Payment of ERI is a level amortization of the UAL attributable to the ERI program for 2003 over 3 years.
- Total Employer Cost is the sum of the Employer Normal Cost and the Amortization of the UAL, both computed as of January 1 of each year and adjusted for annual payments made on July 1. The funding schedule shown in Exhibit 3.2 further limits the increase in annual appropriations to 5% in any year.
- For fiscal year 2018, we show the actual appropriation developed under the previous funding schedule of \$26,141,731.
- Expected benefit payments include payments expected to be made to retired members, beneficiaries, disabled members and active members expected to retire. In addition, expected benefit payments include distribution of the annuity savings fund attributed to inactive members.
- Benefit payments exclude cost-of-living increases granted to members in pay status between 1982 and 1997. In addition, benefit payments are as expected for the first ten years of the forecast, then increase by the greater of 4.50% per year thereafter or the expected future payments for the current population projected by our computer model.

## SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

### Exhibit 3.2 - 30-Year Forecast of Annual Appropriations

Fiscal				Amortization	Amortization	Amortization	Total	Unfunded
Year	Total Normal	Employee	Employer	Payment of	Payment of	Payment of	Employer	Actuarial
Ending	Cost	Contributions	Normal Cost	UAL	ERI 2002	ERI 2003	Cost	Liability
2018	\$15,884,063	\$8,816,692	\$7,067,371	\$18,552,825	\$0	\$521,535	\$26,141,731	\$269,764,647
2019	16,440,004	9,186,389	7,253,615	19,673,667	-	521,536	27,448,818	270,871,707
2020	17,015,405	9,571,164	7,444,241	20,855,481	-	521,537	28,821,259	270,901,099
2021	17,610,944	9,971,621	7,639,323	22,520,825	-	-	30,160,148	269,706,013
2022	18,227,327	10,388,385	7,838,942	23,421,659	-	-	31,260,601	267,231,006
2023	18,865,284	10,822,107	8,043,177	24,358,525	-	-	32,401,702	263,629,095
2024	19,525,569	11,273,464	8,252,105	25,332,866	-	-	33,584,971	258,775,544
2025	20,208,963	11,743,159	8,465,804	26,346,180	-	-	34,811,984	252,534,451
2026	20,916,277	12,231,922	8,684,355	27,400,027	-	-	36,084,382	244,757,825
2027	21,648,346	12,740,514	8,907,832	28,496,029	-	-	37,403,861	235,284,590
2028	22,406,039	13,269,723	9,136,316	29,635,869	-	-	38,772,185	223,939,499
2029	23,190,250	13,820,368	9,369,882	30,821,303	-	-	40,191,185	210,531,978
2030	24,001,910	14,393,305	9,608,605	32,054,156	-	-	41,662,761	194,854,862
2031	24,841,976	14,989,416	9,852,560	33,336,322	-	-	43,188,882	176,683,036
2032	25,711,445	15,609,623	10,101,822	34,669,775	-	-	44,771,597	155,771,969
2033	26,611,346	16,254,884	10,356,462	36,056,567	-	-	46,413,029	131,856,135
2034	27,542,743	16,926,190	10,616,553	37,498,829	-	-	48,115,382	104,647,297
2035	28,506,739	17,624,576	10,882,163	38,998,782	-	-	49,880,945	73,832,666
2036	29,504,475	18,351,115	11,153,360	40,558,734	-	-	51,712,094	39,072,909
2037	30,537,131	19,106,920	11,430,211	-	-	-	11,430,211	-
2038	31,605,930	19,893,153	11,712,777	-	-	-	11,712,777	-
2039	32,712,138	20,711,015	12,001,123	-	-	-	12,001,123	-
2040	33,857,063	21,561,758	12,295,305	-	-	-	12,295,305	-
2041	35,042,060	22,316,419	12,725,641	-	-	-	12,725,641	-
2042	36,268,533	23,097,494	13,171,039	-	-	-	13,171,039	-
2043	37,537,932	23,905,907	13,632,025	-	-	-	13,632,025	-
2044	38,851,759	24,742,613	14,109,146	-	-	-	14,109,146	-
2045	40,211,571	25,608,605	14,602,966	-	-	-	14,602,966	-
2046	41,618,975	26,504,906	15,114,069	-	-	-	15,114,069	-
2047	43,075,640	27,432,577	15,643,063	-	-	-	15,643,063	-

Lowell Contributory Retirement System  
Actuarial Valuation as of January 1, 2017

## SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

### Exhibit 3.3 - 30-Year Forecast of Cash Flow

Calendar Year	Assets, BOY	Benefit Payments	Employee Contributions	Employer Contributions	Investment Return	Assets, EOY
2017	\$329,424,819	\$43,870,558	\$8,493,702	\$25,184,057	\$25,102,538	\$344,334,558
2018	344,334,558	39,361,671	8,849,856	26,443,261	26,515,134	366,781,138
2019	366,781,138	41,154,423	9,220,535	27,765,423	28,250,550	390,863,223
2020	390,863,223	43,006,667	9,606,322	29,055,263	30,109,497	416,627,638
2021	416,627,638	44,870,053	10,007,818	30,115,403	32,089,374	443,970,180
2022	443,970,180	46,799,346	10,425,651	31,214,701	34,191,119	473,002,305
2023	473,002,305	48,695,227	10,860,473	32,354,622	36,427,627	503,949,800
2024	503,949,800	50,630,663	11,312,961	33,536,686	38,813,427	536,982,211
2025	536,982,211	52,599,455	11,783,819	34,762,470	41,362,014	572,291,059
2026	572,291,059	54,601,441	12,273,779	36,033,612	44,088,338	610,085,347
2027	610,085,347	56,683,045	12,783,601	37,351,809	47,006,750	650,544,462
2028	650,544,462	58,817,998	13,314,074	38,718,826	50,132,363	693,891,727
2029	693,891,727	60,907,263	13,866,022	40,136,491	53,486,753	740,473,730
2030	740,473,730	63,092,941	14,440,295	41,606,706	57,090,931	790,518,721
2031	790,518,721	64,997,930	15,037,782	43,131,439	60,978,537	844,668,549
2032	844,668,549	66,828,522	15,659,404	44,712,739	65,190,779	903,402,949
2033	903,402,949	68,553,120	16,306,118	46,352,728	69,766,292	967,274,967
2034	967,274,967	70,294,014	16,978,919	48,053,612	74,742,937	1,036,756,421
2035	1,036,756,421	71,997,020	17,678,842	49,817,678	80,159,695	1,112,415,616
2036	1,112,415,616	73,526,313	18,406,959	11,011,478	84,360,598	1,152,668,338
2037	1,152,668,338	74,774,673	19,164,389	11,283,693	87,471,003	1,195,812,750
2038	1,195,812,750	76,056,006	19,952,290	11,561,475	90,805,642	1,242,076,151
2039	1,242,076,151	77,209,271	20,771,867	11,844,880	94,388,945	1,291,872,572
2040	1,291,872,572	78,291,094	21,498,882	12,259,451	98,250,676	1,345,590,487
2041	1,345,590,487	79,147,345	22,251,343	12,688,532	102,427,470	1,403,810,487
2042	1,403,810,487	79,728,209	23,030,140	13,132,631	106,966,472	1,467,211,521
2043	1,467,211,521	80,445,630	23,836,195	13,592,273	111,903,068	1,536,097,427
2044	1,536,097,427	81,061,241	24,670,462	14,068,002	117,270,876	1,611,045,526
2045	1,611,045,526	81,440,428	25,533,928	14,560,382	123,120,353	1,692,819,761
2046	1,692,819,761	81,541,195	26,427,615	15,069,996	129,512,535	1,782,288,712

Lowell Contributory Retirement System  
Actuarial Valuation as of January 1, 2017

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## SECTION 4 - REQUIRED DISCLOSURES

### Exhibit 4.1 - GASB 67 and GASB 68 Disclosures

In June 2012, the GASB approved two related Statements that significantly changed the way pension plans and governments account and report pension liabilities. Effective for plans with fiscal years beginning after June 15, 2013, GASB Statement No. 67, *Financial Reporting for Pension Plans*, replaced the requirements of Statement No. 25 and effective for employers with fiscal years beginning after June 15, 2014, GASB Statement No. 68, *Accounting and Financial Reporting for Pensions*, replaced the requirements of Statement No. 27.

The new pension standards reflect changes from those currently in place regarding how governments calculate total pension liability and pension expense. Further, the new standards contain requirements for disclosing information in the notes to financial statements and presenting required supplementary information following the notes.

GASB 67 requires defined benefit pension plans, such as the Lowell Contributory Retirement System, to present a statement of fiduciary net position (pension plan assets) and a statement of changes in fiduciary net position. Further, the statement requires that notes to financial statements include descriptive information such as the types of benefits provided, the classes of plan members covered and the composition of the pension plan's retirement board. Finally, GASB 67 requires pension plans to present in required supplementary information the sources of the changes in the net pension liability and information about the actuarially determined contributions compared with the actual contributions made to the plan

GASB 67 and GASB 68 require projected benefit payments be discounted to their actuarial present value using the single rate that reflects:

- (1) a long-term expected rate of return on pension plan investments *to the extent that the pension plan's assets are sufficient to pay benefits and pension plan assets are expected to be invested using a strategy to achieve that return and*
- (2) a tax-exempt, high-quality municipal bond rate *to the extent that the conditions for use of the long-term expected rate of return are not met.*

GASB 68 establishes standards for measuring and recognizing liabilities, deferred outflows of resources, deferred inflows of resources and pension expense by state and local governments.

The effective date for GASB 67 is for plan years beginning after June 15, 2013, which is fiscal year ending December 31, 2014 for the Lowell Contributory Retirement System. The effective date for GASB 68 is for employers' fiscal years beginning after June 15, 2014. The GASB report, submitted under separate cover and prepared as of December 31, 2016 (the measurement date), presents information to assist the Lowell Contributory Retirement System in providing the required information under GASB 68 to participating employers.

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## SECTION 4 - REQUIRED DISCLOSURES

### Exhibit 4.2 - PERAC DISCLOSURE INFORMATION

The most recent actuarial valuation of the System was prepared by KMS Actuaries, LLC as of January 1, 2017.

The normal cost for employees on that date was:	\$8,493,702	9.2% of payroll
The normal cost for the employer was:	\$6,808,465	7.3% of payroll

The actuarial liability for active members was:	\$252,426,351
The actuarial liability for retired and inactive members was:	361,055,376
Total actuarial liability:	\$613,481,727
System assets as of that date:	\$343,717,080
Unfunded actuarial accrued liability:	\$269,764,647

The ratio of System assets to total actuarial accrued liability was:	56.0%
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The principal actuarial assumptions used in the valuation are as follows:

Investment Return:	7.75%
Rates of Salary Increase:	6%-4.25% for Group 1 (based on service)
	7%-4.75% for Group 4 (based on service)

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## SECTION 5 - SUMMARY OF PLAN PROVISIONS

### Administration

There are 105 contributory retirement systems for public employees in Massachusetts. Each system is governed by a retirement board and all boards, although operating independently, are governed by Chapter 32 of the Massachusetts General Laws and other applicable statutes. This law in general provides uniform benefits, uniform contribution requirements and a uniform accounting and funds structure for all systems.

### Participation

Participation is mandatory for all full-time employees. Eligibility with respect to part-time, provisional, temporary, seasonal or intermittent employment is governed by regulations promulgated by the local retirement board, and approved by PERAC. Membership is optional for certain elected officials.

There are four classes of membership in the Retirement System:

- |          |  |
|----------|--|
| Group 1: | General employees, including clerical, administrative, technical and all other employees not otherwise classified. |
| Group 2: | Certain specified hazardous duty positions.  |
| Group 3: | State police officers and inspectors.  |
| Group 4: | Local police officers, firefighters and other specified hazardous positions.                                       |

For members in more than one group, participation will be proportional.

### Member Contributions

Member contributions vary depending on the most recent date of membership:

- |  |   |
|--|---|
| Prior to 1975:                             | 5% of Salary  |
| 1975 – 1983:                               | 7% of Salary  |
| 1984 – June 30, 1996:                      | 8% of Salary  |
| July 1, 1996 – present:                    | 9% of Salary  |
| 1979 – present:                            | An additional 2% of Salary in excess of \$30,000.         |
| Group 1 members hired on or after April 2, | 6% of Salary with 30 or more years of creditable service. |

### Rate of Interest

Interest on regular deductions made after January 1, 1984 is a rate established by PERAC in consultation with the Commissioner of Banks. The rate is obtained from the average rates paid on individual savings accounts by a representative sample of at least ten financial institutions.

## SECTION 5 - SUMMARY OF PLAN PROVISIONS

<b>Retirement Age</b>	The mandatory retirement age for some Group 2 and Group 4 members is age 65. Most Group 2 and Group 4 members may remain in service after reaching age 65. Group 4 members who are employed in certain public safety positions are required to retire at age 65. There is no mandatory retirement age for members in Group 1.
<b>Salary</b>	Gross regular compensation. This does not include bonuses, overtime, severance pay, unused sick leave credit or other similar compensation.
<b>Average Salary</b>	Membership before April 2, 2012: Average annual rate of regular compensation received during the three consecutive years that produce the highest average, or, if greater, during the last three years (whether or not consecutive) preceding retirement. Membership on or after April 2, 2012: Average annual rate of regular compensation received during the five consecutive years that produce the highest average, or, if greater, during the last five years (whether or not consecutive) preceding retirement.
<b>Creditable Service</b>	The period during which a member contributes to the retirement system plus certain periods of military service and "purchased" service.
<b>Benefit Rate</b>	The benefit rate varies with the member's retirement age, Group, membership date and years of creditable service at retirement. Each year a member retires prior to the age at which the 2.5% maximum benefit rate applies, a reduction is applied to each year of age under the maximum age. The maximum age and reduction for each Group and membership date is as follows:

	<u>Group 1</u>	<u>Group 2</u>	<u>Group 4</u>
2.5% for Membership before April 2, 2012:			
Maximum age:	65	60	55
Reduction:	0.1%	0.1%	0.1%
2.5% for Membership on or after April 2, 2012 (less than 30 years of service):			
Maximum age:	67	62	57
Reduction:	0.15%	0.15%	0.15%
2.5% for Membership on or after April 2, 2012 (30+ years of service):			
Maximum age:	67	62	57
Reduction:	0.125%	0.125%	0.125%

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## SECTION 5 - SUMMARY OF PLAN PROVISIONS

### Superannuation Retirement

Eligibility if membership before April 2, 2012:	<ul style="list-style-type: none"><li>• completion of 20 years of Creditable Service, or</li><li>• attainment of age 55 if hired prior to 1978, or</li><li>• attainment of age 55 with 10 years of Creditable Service, if hired after 1978.</li></ul>
Eligibility if membership on or after April 2,	<ul style="list-style-type: none"><li>• attainment of age 60 with 10 years of Creditable Service if classified in Group 1</li><li>• attainment of age 55 with 10 years of Creditable Service if classified in Group 2</li><li>• attainment of age 55 if hired prior to 1978 or if classified in Group 4</li></ul>
Benefit Amount	Product of the member's Benefit Rate, Average Salary and Creditable Service.
Maximum Benefit	80% of the member's Average Salary.
Veteran's Benefit	Additional benefit of \$15 per year of Creditable Service, up to a maximum of \$300.

### Deferred Vested

Eligibility	<ul style="list-style-type: none"><li>• completion of ten or more years of Creditable Service.</li><li>• elected officials hired prior to 1978, completion of six years of Creditable Service.</li></ul>
Benefit Amount	Accrued benefit payable commencing at age 55, or the completion of 20 years of Creditable Service, or may be deferred until later at the participant's option.

### Withdrawal of Contributions

- Contributions may be withdrawn upon termination of employment.
- Members hired prior to 1984 receive contributions plus 100% of interest credited.
  - Members hired after 1983 with less than five years of Creditable Service receive contributions only.
  - Members hired after 1983 with more than five years of Creditable Service but less than ten years receive contributions plus 50% of interest credited.
  - Members hired after 1983 with more than ten years of Creditable Service receive contributions plus 100% of interest credited.



## SECTION 5 - SUMMARY OF PLAN PROVISIONS

<b>Ordinary Disability Retirement</b>	Eligibility	Non-job related disability after completion of ten years of Creditable Service.
	Benefit Amount for Group 1 membership before April 2, 2012 or Group 2 or Group 4	Superannuation benefit determined if the member is age 55, up to a maximum of 80% of Average Salary over three years. If the member is a veteran, 50% of final rate of salary (final year) plus an annuity based on the accumulated member contributions plus credited interest, up to a maximum of 80% of Average Salary over five years.
	Benefit Amount for Group 1 membership on or after April 2, 2012	Superannuation benefit determined if the member is age 60, up to a maximum of 80% of Average Salary over three years. If the member is a veteran, 50% of final rate of salary (final year) plus an annuity based on the accumulated member contributions plus credited interest, up to a maximum of 80% of Average Salary over five years.
<b>Accidental Disability Retirement</b>	Eligibility	Disabled as a result of an accident in the performance of duties. There is no minimum age or service requirement.
	Benefit Amount	72% of Salary plus an annuity based on accumulated member contributions plus credited interest.
	Maximum Benefit	100% of Salary if hired before January 1, 1988, otherwise 75% of Salary.
	Veteran's Benefit	Additional allowance of \$15 per year of Creditable Service, up to a maximum of \$300.
	Supplemental	Additional allowance of \$415 per year for each child.
<b>Non-Occupational Death</b>	Eligibility	For members with at least two years of creditable service who die while in active service, but not due to occupational
	Benefit Amount	Benefit as if Option C had been elected. Minimum benefit of \$250 per month for surviving spouse, \$120 per month for first child and \$90 per month for each additional child.

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## SECTION 5 - SUMMARY OF PLAN PROVISIONS

<b>Accidental Death</b>	Eligibility	For members who die as a result of an occupational injury.
	Benefit Amount	72% of Salary plus an annuity based on accumulated member contributions plus credited interest.
	Maximum Benefit	100% of Salary if hired before January 1, 1988, otherwise 75% of Salary.
	Veteran's Benefit	Additional allowance of \$15 per year of creditable service, up to a maximum of \$300.
	Supplemental Dependent Allowance	Additional allowance of \$708.60 per year for each child until age 18 (or age 22 if a full-time student).
<b>Cost-of-Living Adjustment (COLA)</b>	In accordance with the adoption of Chapter 17 of the Acts of 1997, the granting of a Cost-of-Living Adjustment will be determined by an annual vote by the Retirement Board. The amount of increase will be based upon the Consumer Price Index, limited to a maximum of 3.0%, beginning on July 1. All retirees, disabled retirees and beneficiaries who have been receiving benefit payments for at least one year as of July 1 are eligible for the adjustment. The maximum amount of pension benefit subject to a COLA is \$16,000, effective July 1, 2016, and \$17,000, effective July 1, 2017. All COLAs granted to members after 1981 and prior to July 1, 1998 are deemed to be an obligation of the Commonwealth of Massachusetts and are not the liability of the	
<b>Optional Forms of Payment</b>	A member may elect to receive his or her retirement allowance in one of three forms of payment: <ul style="list-style-type: none"><li>• Option A – Total annual allowance commencing at retirement and terminating at member's death.</li><li>• Option B – A reduced annual allowance commencing at retirement with death benefit equal to excess of member contributions plus credited interest to retirement over annuity benefit paid to member.</li><li>• Option C – A reduced annual allowance commencing at retirement with 66⅔% of benefit continued to designated beneficiary upon death of member. For members who retired on or after January 12, 1988, if the beneficiary pre-deceases the retiree, the benefit payable increases based on the factor used to determine the Option C benefit at retirement. For members who retired prior to January 12, 1988, if the System has accepted Section 288 of Chapter 194 of the Acts of 1998 and the beneficiary pre-deceases the retiree, the benefit payable increases based on the factor used to determine the Option C benefit at retirement.</li></ul>	

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## SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

**Valuation Date:** January 1, 2017

**Investment Return:** 7.75% per year.

The investment return assumption is a long-term assumption based on capital market expectations by asset class, historical returns and professional judgment. We considered analysis prepared by PRIM's investment advisor using a building block approach and using the target asset allocation, expected returns by asset class and risk analysis to determine a long-term expected average annual rate of return.

Previously, 8% per year.

**Annuity Savings Fund Interest Rate:** 3.00% per year

**Amortization Method:** *Unfunded Actuarial Accrued Liability (UAL):*

Increasing dollar amount at 4.00% to reduce the Unfunded Actuarial Accrued Liability to zero on or before June 30, 2036, with annual increases in appropriations limited to 5%.

*Early Retirement Incentive Programs (ERI):*

Level dollar amount over three years (2003 ERI).

**Salary Scale:** The assumed annual rates for salary increases including longevity are illustrated by the following rates:

<u>Service</u>	<u>General Employees</u>	<u>Police and Fire</u>
0	6.00%	7.00%
1	5.50%	6.50%
2	5.50%	6.00%
3	5.25%	5.75%
4	5.25%	5.25%
5	4.75%	5.25%
6	4.75%	4.75%
7	4.50%	4.75%
8	4.50%	4.75%
9	4.25%	4.75%

The salary scale assumption is a long-term estimate derived from historical data, current and recent market expectations and professional judgment.

## SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

**Cost-of-Living Allowance:** Cost-of-Living Allowances (COLA) are assumed to be 3% of the pension amount, capped at \$510 per year.

**Mortality Table:** RP-2000 Mortality Table (base year 2009) with full generational mortality improvement using Scale BB. For disabled members, RP-2000 Mortality Table (base year 2015) with full generational mortality improvement using Scale BB. Previously, RP-2000 Mortality Table projected to 2012 with Scale AA.

*General Employees:* 55% of deaths are job-related.

*Police and Fire:* 90% of deaths are job-related.

The underlying tables with generational mortality improvement reasonably reflect the mortality experience of the System as of the valuation date based on historical and current demographic data. Further, PERAC reviewed a sampling of a few larger local retirement systems and compared the results with the results found in performing the analysis of the State Retirement System for years 2012 - 2014. For the State Retirement System analysis, the mortality assumptions reflect the recent experience study published in 2014.

**Turnover Rates:** Illustrative turnover rates are shown below:

<u>Creditable Service</u>	<u>General Employees</u>	<u>Police and Fire</u>
0	0.1500	0.0150
10	0.0540	0.0150
20	0.0200	0.0000
30	0.0000	0.0000

**Disability Rates:** Illustrative disability rates are shown below:

<u>Attained Age</u>	<u>General Employees</u>	<u>Police and Fire</u>
20	0.0001	0.0010
30	0.0003	0.0030
40	0.0010	0.0030
50	0.0019	0.0125

*General Employees:* 55% of disabilities are accidental and 45% are ordinary.

*Police and Fire:* 90% of disabilities are accidental and 10% are ordinary.

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## SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

### Retirement Rates:

Illustrative retirement rates are shown below:

<u>Age</u>	<u>General Employees</u>		<u>Police and Fire</u>
	<u>Male</u>	<u>Female</u>	<u>Male &amp; Female</u>
50	0.0100	0.0150	0.0200
51	0.0100	0.0150	0.0200
52	0.0100	0.0200	0.0200
53	0.0100	0.0250	0.0500
54	0.0200	0.0250	0.0750
55	0.0200	0.0550	0.1500
56	0.0250	0.0650	0.1000
57	0.0250	0.0650	0.1000
58	0.0500	0.0650	0.1000
59	0.0650	0.0650	0.1500
60	0.1200	0.0500	0.2000
61	0.2000	0.1300	0.2000
62	0.3000	0.1500	0.2500
63	0.2500	0.1250	0.2500
64	0.2200	0.1800	0.3000
65	0.4000	0.1500	1.0000
66	0.2500	0.2000	1.0000
67	0.2500	0.2000	1.0000
68	0.3000	0.2500	1.0000
69	0.3000	0.2000	1.0000
70	1.0000	1.0000	1.0000

The turnover, disability and retirement rates are based on PERAC's most recent experience analysis of local retirement systems which reviewed age, gender and job group. The assumptions reflect this analysis as well as professional judgment.

### Actuarial Cost Method:

Individual Entry Age Normal.

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## SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

**Actuarial Asset Method:** The Actuarial Value of Assets is the market value of assets as of the valuation date reduced by the sum of:

- a) 80% of gains and losses of the prior year,
- b) 60% of gains and losses of the second prior year,
- c) 40% of gains and losses of the third prior year and
- d) 20% of gains and losses of the fourth prior year.

Investment gains and losses are determined by the excess or deficiency of the expected return over the actual return on the market value. The actuarial valuation of assets is further constrained to be not less than 90% or more than 110% of market value.

**Census Data:** Census data as of the valuation date were submitted by the Retirement Board.

**Asset Data:** Asset information is reported annually to the Public Employee Retirement Administration Commission by the Lowell Contributory Retirement System.

**Dependents:** 80% of all members will be survived by a spouse. Age assumption for spouses is that males are assumed to be three years older than females.

**Administrative Expenses:** The anticipated administrative expenses for the fiscal year. For Fiscal Year 2018, the administrative expenses were assumed to be \$400,000 and is anticipated to increase at 3.5% per year. Previously, \$350,000 per year.

The administrative expense assumption is based on information relating to the System's administrative expenses provided by the Retirement System.

## SECTION 7 - PLAN MEMBER INFORMATION

**Exhibit 7.1 - Active Members by Age and Years of Service as of January 1, 2017**

Age	Years of Service									Total
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	
Under 20	-	-	-	-	-	-	-	-	-	0
	-	-	-	-	-	-	-	-	-	0
20-24	48	1	-	-	-	-	-	-	-	49
	33,003	39,876	-	-	-	-	-	-	-	33,143
25 to 29	123	21	1	-	-	-	-	-	-	145
	41,999	59,373	62,972	-	-	-	-	-	-	44,660
30 to 34	97	61	22	-	-	-	-	-	-	180
	44,641	60,628	59,795	-	-	-	-	-	-	51,911
35 to 39	59	33	52	21	1	-	-	-	-	166
	44,582	63,500	69,793	63,585	50,793	-	-	-	-	58,682
40 to 44	35	20	41	52	17	1	-	-	-	166
	44,067	51,514	67,531	74,525	69,684	74,777	-	-	-	63,109
45 to 49	46	29	41	57	42	15	2	-	-	232
	44,419	43,502	55,684	58,314	73,293	77,780	82,764	-	-	57,424
50 to 54	33	29	52	48	45	51	23	-	-	281
	40,083	41,014	52,168	46,955	69,943	83,117	82,856	-	-	59,683
55 to 59	27	22	36	45	25	27	30	8	-	220
	46,340	44,171	42,803	47,551	62,871	68,624	82,481	97,806	-	57,205
60 to 64	20	9	25	29	34	25	17	12	5	176
	42,415	49,226	47,456	43,648	44,014	53,584	54,917	79,825	106,418	51,154
65 to 69	2	5	9	15	8	10	2	-	1	52
	28,041	42,566	52,085	52,814	34,838	42,061	55,784	-	36,049	45,708
70 & up	-	1	4	5	2	11	1	-	2	26
	-	18,984	40,201	37,150	52,646	42,141	36,713	-	60,264	41,985
Total	490	231	283	272	174	140	75	20	8	1,693
Average Salary	42,397	52,850	56,993	55,779	62,721	68,265	75,034	87,018	86,083	54,820
Average Age:							46.8	Average Service:		13.1

Lowell Contributory Retirement System  
Actuarial Valuation as of January 1, 2017

## SECTION 7 - PLAN MEMBER INFORMATION

**Exhibit 7.2 - Retired Plan Members and Beneficiaries Annual Pensions as of January 1, 2017**

Attained Age	Male		Female		Total	
	Count	Total Payments	Count	Total Payments	Count	Total Payments
<20	0	0	1	17,571	1	17,571
20-24	0	0	1	9,349	1	9,349
25-29	0	0	0	0	0	0
30-34	1	15,444	1	15,019	2	30,463
35-39	0	0	0	0	0	0
40-44	0	0	0	0	0	0
45-49	2	54,929	5	97,972	7	152,901
50-54	2	197,693	9	285,531	11	483,224
55-59	32	1,556,380	29	407,882	61	1,964,262
60-64	83	3,941,664	71	1,343,563	154	5,285,228
65-69	106	4,231,086	111	2,139,540	217	6,370,627
70-74	84	3,007,997	85	1,469,001	169	4,476,998
75-79	72	2,229,683	95	1,657,121	167	3,886,803
80-84	40	1,459,903	50	746,312	90	2,206,215
85-89	33	1,201,029	63	971,988	96	2,173,017
90-94	11	252,300	29	488,346	40	740,646
95+	2	53,709	10	172,201	12	225,910
Total	468	18,201,818	560	9,821,398	1,028	28,023,215
Average Age	71.5		73.7		72.7	
Average Payment		38,893		17,538		27,260
	45.5%	65.0%	54.5%	35.0%	100.0%	100.0%

Included in above totals is \$193,616 in State reimbursed COLAs.



## SECTION 7 - PLAN MEMBER INFORMATION

**Exhibit 7.3 - Disabled Plan Members Annual Pensions as of January 1, 2017**

Attained Age	Male		Female		Total	
	Count	Total Payments	Count	Total Payments	Count	Total Payments
<20	0	0	0	0	0	0
20-24	0	0	0	0	0	0
25-29	0	0	0	0	0	0
30-34	0	0	0	0	0	0
35-39	5	208,033	0	0	5	208,033
40-44	5	251,561	1	48,043	6	299,604
45-49	12	521,714	3	109,765	15	631,480
50-54	11	487,165	3	128,524	14	615,690
55-59	14	696,088	5	113,999	19	810,086
60-64	21	1,039,667	10	225,324	31	1,264,991
65-69	42	1,906,407	2	70,377	44	1,976,783
70-74	20	710,212	1	6,341	21	716,553
75-79	13	553,200	2	29,287	15	582,486
80-84	17	545,080	1	5,492	18	550,572
85-89	5	139,529	1	11,528	6	151,057
90-94	2	67,292	1	20,780	3	88,072
95+	1	21,356	0	0	1	21,356
Total	168	7,147,304	30	769,459	198	7,916,762
Average Age	65.9		66.5		66.0	
Average Payment		42,543		25,649		39,984
	84.8%	90.3%	15.2%	9.7%	100.0%	100.0%

Included in above totals is \$109,309 in State reimbursed COLAs.

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## SECTION 8 - GLOSSARY OF TERMS

**Actuarial Accrued Liability** – That portion of the Actuarial Present Value of pension plan benefits which is not provided by future Normal Costs or employee contributions. It is the portion of the Actuarial Present Value attributable to service rendered as of the Valuation Date.

**Actuarial Assumptions** – Assumptions, based upon past experience or standard tables, used to predict the occurrence of future events affecting the commencement, amount and duration of pension benefits, such as: changes in compensation, mortality, withdrawal, disablement and retirement; rates of investment earnings and asset appreciation or depreciation; and any other relevant items.

**Actuarial Cost Method (or Funding Method)** – A procedure for allocating the Actuarial Present Value of all past and future pension plan benefits to the current year (Normal Cost) and the past (Actuarial Accrued Liability).

**Actuarial Gain or Loss (or Experience Gain or Loss)** – A measure of the difference between actual experience and that expected based upon the set of Actuarial Assumptions, during the period between the valuation date and the most recent immediately preceding valuation date.

**Actuarial Present Value** – The dollar value on the valuation date of all benefits expected to be paid to current members based upon the Actuarial Assumptions and the terms of the Plan.

**Amortization Payment** – That portion of the pension plan appropriation which represents payments made to pay interest on and the reduction of the Unfunded Accrued Liability.

**Annual Statement** – The statement submitted by the local retirement board to PERAC each year that describes the asset holdings and Fund balances as of December 31 and the transactions during the calendar year that affected the financial condition of the retirement system.

**Annuity Reserve Fund** – The fund into which total accumulated Member Contributions, including interest, is transferred at the time a member retires, and from which annuity payments are made.

**Annuity Savings Fund** – The fund in which Member Contributions plus interest credited are held for active members and for former members who have not withdrawn their contributions and are not yet receiving a benefit (inactive members).

**Assets** – The total value of the investments held by the Plan trust that are for the payment of promised benefits.

**Cost of Benefits** – The estimated payment from the pension system for benefits for the fiscal year.

**Expense Fund** – The fund into which the appropriation for administrative expenses is paid and from which all such expenses are paid.

**Funded Ratio** – The Actuarial Value of Assets expressed as a percentage of the Actuarial Accrued Liability.

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## SECTION 8 - GLOSSARY OF TERMS

**Funding Schedule** – The schedule based upon the most recently approved actuarial valuation which sets forth the amount which would be appropriated to the pension system in accordance with Section 22D of M.G.L. Chapter 32.

**GASB** – Governmental Accounting Standards Board.

**Normal Cost** – Total Normal Cost is that portion of the Actuarial Present Value of pension plan benefits which is expected to accrue in the current fiscal year. The Employee Normal Cost is the amount of the expected Member Contributions for the current fiscal year. The Employer Normal Cost is the difference between the Total Normal Cost and the Employee Normal Cost.

**Pension Fund** – The fund into which appropriation amounts as determined by PERAC are paid and from which pension benefits are paid.

**Pension Reserve Fund** – The fund which shall be credited with all amounts set aside by a system for the purpose of establishing a reserve to meet future pension liabilities. These amounts would include excess interest earnings.

**Present Value of Future Benefits** – The actuarial present value of the cost to finance benefits payable in the future, discounted to reflect the expected effects of the time value of money and the probabilities of payment.

**Special Fund for Military Service Credit** – The fund which is credited with amounts paid by the retirement board equal to the amount which would have been contributed by a member during a military leave of absence as if the member had remained in active service of the retirement board. In the event of retirement or a non-job related death, such amount is transferred to the Annuity Reserve Fund. In the event of termination prior to retirement or death, such amount shall be transferred to the Pension Fund.

**Unfunded Actuarial Accrued Liability** – The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.